

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
)	
Establishment of a Model for Predicting)	ET Docket No. 10-152
Digital Broadcast Television Field Strength)	
Received at Individual Locations)	
)	

REPLY COMMENTS OF DISH NETWORK L.L.C.

DISH Network L.L.C. (“DISH”) files these reply comments in response to the *Further Notice* in the above-captioned proceeding concerning improvements to the Commission’s model for predicting digital broadcast television field strength at individual locations more accurately and reliably.¹ The comments filed in response to the *Further Notice* leave no doubt that the existing method for predicting eligibility is seriously inaccurate. The main difference of view among commenters is whether the Commission should cure its inaccuracies. Givens & Bell, DIRECTV and DISH believe that it should do so. The broadcasters suggest that the Commission should accept the flaws of the model for reasons that are unconvincing and internally contradictory, including the insincere concern that adopting the ITWOM model would increase the number of served household predictions – an increase that, if true, would only redound to the broadcasters’ own benefit.

As for how to cure the inaccuracy, DIRECTV and the Givens & Bell engineering firm have different prescriptions (the AntennaWeb model that is endorsed by the broadcasters in another context, and the ITWOM adjustment to the ILLR model respectively), both with some

¹ Establishment of a Model for Predicting Digital Broadcast Television Field Strength Received at Individual Locations, ET Docket No. 10-152, *Report and Order and Further Notice of Proposed Rulemaking*, FCC 10-194 (rel. Nov. 23, 2010) (“*Further Notice*”).

apparent merit. To decide the best course for improving the model, the Commission should compare them with the ILLR model and with one another by means of field studies to be completed in a meaningful time frame – no longer than six months. In choosing the best method, the Commission should use two primary criteria: which method results in the lowest average difference between predicted and actual strength; and which results in the lowest median difference between predicted and actual strength. The Commission also should consider grafting some of AntennaWeb’s features (such as the use of a 90% confidence factor) onto the ITWOM model. In any event, if the method favored by these criteria still results in an average overprediction, the Commission should simply subtract this average exceedance from the predicted strength for the purpose of determining a household’s eligibility to receive distant network stations by satellite.

But the Commission should not await the outcome of these tests to begin to mitigate what, with the broadcasters’ grudging and partial admission, is now a near-consensus on the endemic inaccuracy of the ILLR model. Until the tests are completed, the Commission should, at a minimum, use the AntennaWeb tool and the ITWOM adjustments as a check on the ILLR model in the following sense: if a household is predicted as served by ILLR, but as unserved under either of the other two methods, it should not be denied distant network stations, if it is otherwise eligible for them.

And, whether or not it does anything else, the Commission should reconsider the artificial assignment of a value of zero to the land use/land clutter variable. There is no question that the loss due to land use/clutter loss is greater than zero. The only reason why it was set at zero was the broadcasters’ argument that the ILLR model already underpredicts signal strength and therefore recognition of the loss would supposedly make the model more inaccurate still. The

Shumate field studies discredit this argument. They show that the ILLR model *overpredicts* strength, and therefore recognition of land use/clutter losses would make it less inaccurate.

I. DISH AGREES WITH DIRECTV ON THE APPARENT MERITS OF THE ANTENNAWEB MODEL

DIRECTV advocates the use of the AntennaWeb model, endorsed by the broadcasters in a non-partisan context where the prediction of low signal strength does not hurt their interests.² The broadcast industry uses this model to inform consumers what type of antenna they need to receive an adequate signal over the air. As DIRECTV observes, if that model predicts that a household cannot receive the signals by means of *any* antenna, it is an unacceptable fiction to predict that household as served by applying the ILLR model.³ Yet this is precisely what happens, in an unsettling number of cases. According to DIRECTV, a three-DMA analysis shows that an astonishing 44% of DIRECTV's subscribers are predicted served by the ILLR model and predicted unable to receive any signal at all (not just unable to receive a strong enough signal) by AntennaWeb.⁴

² DIRECTV Comments at 2. DIRECTV describes AntennaWeb as follows:

AntennaWeb.org ("AntennaWeb") [is] a website created by the National Association of Broadcasters ("NAB") and the Consumer Electronics Association ("CEA"), which uses an ILLR-based model to recommend an appropriate antenna for consumers seeking to receive over-the-air digital broadcast signals. Having created AntennaWeb, broadcasters have endorsed the predictive methodology employed by that website to give consumers real-world advice about whether or not they can receive over-the-air digital television signals. This advice, moreover, often conflicts with the predictions of digital ILLR. Thus, subscribers are often told that they cannot receive distant signals because the Commission's model predicts they will receive local signals only to discover that the NAB's more accurate model predicts otherwise.

Id.

³ *Id.* at 7-8.

⁴ *Id.* at 4.

DISH agrees with DIRECTV's suggestion of using AntennaWeb, at least in the short term (*see* below), and believes that the imprimatur of the broadcasters' own endorsement of AntennaWeb attests to its accuracy.

II. THE BROADCASTERS' OBJECTIONS TO CHANGE ARE UNCONVINCING AND CONTRADICT ONE ANOTHER

The only commenter opposing changes to the ILLR model, the broadcast industry, acknowledges the inaccuracies of the model, but essentially asks the Commission to leave "not too bad" alone.⁵ The reason, according to the broadcasters, is that the model produces not only false positives (*i.e.*, households that are unserved but are predicted to be served, and that are unfairly deemed ineligible) but also false negatives, therefore resulting in some sort of rough justice.⁶

According to the broadcasters, it is all right if the "majority of prediction errors" is "positive" (*i.e.*, unserved households that are denied service because they are predicted as served) so long as "numerous prediction errors" are "negative."⁷ While in all cases rough symmetry provides no comfort to the unserved households that are disenfranchised, it might be more defensible if the errors were small and offset one another, so that the average prediction was close to the average actual signal strength. But there is no symmetry of any kind, rough or otherwise, when the ILLR model overpredicts signal strength by 6.63 dBu, as the Givens & Bell field studies suggest.⁸

⁵ NAB Comments at 9-10.

⁶ *See id.* at 15.

⁷ *Id.*

⁸ Comments of Sidney Shumate, Givens & Bell, Inc., ET Docket Nos. 06-94, 10-152 at 6-9 (Aug. 24, 2010) ("ITWOM Proposal").

Improbably, the broadcasters next oppose ITWOM adjustments for fear that they will result in *fewer* unserved households, and therefore in *fewer* households eligible to receive distant network signals. As the comments state: “a methodology that virtually, uniformly over-predicts signal strength, even if by only 2 dBu on average, is a methodology that will almost certainly under-predict eligibility and therefore will be less accurate than the current ILLR model.”⁹

The broadcast industry has, of course, consistently fought any eligibility of consumers to purchase distant networks, so it is hard to credit its comments when they profess the reverse concern. But in any event, DISH shares the fear that the ITWOM adjustments may underpredict eligibility. To allay this fear, DISH has proposed a simple solution – subtracting from the prediction the average exceedance of predicted strength over actual strength. DISH totally agrees with the broadcasters when they emphasize in their comments the following language from the SHVIA Conference Report: “The linchpin of whether particular proposed refinements to the ILLR model result in greater accuracy is whether the revised model’s predictions are closer to the results of actual field testing in terms of predicting whether households are served by a local affiliate of the relevant network.”¹⁰ But while they profess the right sentiment as to the correct criterion, the broadcasters seem blind to its implications. If the ILLR model overpredicts strength by 6.63 dBu, there is vast room for “greater accuracy” under the standard articulated by the Conference Report – for predictions, that is, that are closer to the results of actual field testing.

The other objections of the broadcast industry’s comments to the idea of improving the ILLR model are equally unconvincing. The broadcasters essentially (and inconsistently) argue that the ITWOM proposal should be dismissed out-of-hand both because it does too much, and

⁹ NAB Comments at 15.

¹⁰ *Id.* at 8.

because it does very little. According to them, it does too much because it is “different in kind, not just degree,” and because “it would actually alter the fundamental manner in which the signal intensity predictions are calculated.”¹¹ It does too little because it fails the “cost/benefit test,” as “it would provide only marginally more accurate predictions unlikely to change the final determination.”¹² But the broadcasters do not cite any costs to be offset against the benefit of greater accuracy that study of the model potentially promises, and it is specious to suggest that the Congressional language “by the use of additional data” does not extend to methodological changes. If new data show the current model to be inaccurate, precisely as the field studies cited by Givens & Bell do, then the only way to improve the model is by a methodological change, and that is what Congress mandated.¹³ As for their claim that the Givens & Bell study has not been peer-reviewed, the broadcasters are proposing a double-standard: there was no peer-review of the Jules Cohen analysis submitted by the broadcasters in support of the zero VHF adjustment for land use/clutter loss, either. In any event, this proceeding is the appropriate forum for a rigorous review of ITWOM to occur. As for the mystifying claim that the ILLR model is “well-accepted by the affected industries,”¹⁴ it is in fact accepted only by one of the three affected constituencies (the broadcast industry itself), as both the consumers wishing to purchase distant network signals and the satellite industry have been inflicted by the model’s inaccuracies.

III. RECOMMENDATIONS

It is clear, then, that the ITWOM adjustment should not be dismissed automatically. Nor should it be adopted automatically. DISH agrees that the source code requires further study and

¹¹ NAB Comments at 15.

¹² *Id.* at iii.

¹³ 47 U.S.C. § 339(c)(3).

¹⁴ NAB Comments at 4-5.

further field studies should be undertaken to validate the results of the Givens & Bell studies,¹⁵ compare the accuracy of ITWOM to that of the AntennaWeb method, and also consider a synthesis of the two methods. The further study and validation can and should be completed in a matter of months – DISH proposes a limit of six months.¹⁶ In the same process, the Commission should reconsider the artificial assignment of a zero clutter value to the land use/clutter loss variable: the Shumate field results suggest that a greater-than-zero adjustment would improve the accuracy of the predictive method, and not make it less accurate, as the Commission had previously thought based on the broadcast industry’s submissions. For the interim, the Commission should use both of the ITWOM and AntennaWeb tools as checks on the ILLR model, in the manner suggested above.

Respectfully submitted,

DISH NETWORK L.L.C.

Alison A. Minea
Corporate Counsel
DISH NETWORK L.L.C.
1110 Vermont Avenue N.W.
Suite 750
Washington, D.C. 20005
(202) 293-0981

February 7, 2011

/s/ _____
Pantelis Michalopoulos
Christopher Bjornson
Andrew W. Guhr
STEPTOE & JOHNSON LLP
1330 Connecticut Avenue, N.W.
Washington, D.C. 20036
(202) 429-3000

Counsel for DISH Network L.L.C.

¹⁵ Givens & Bell that indicated that a “FORTRAN port of this version (ITWOM source code), utilizing and modifying the published source code utilized by the FCC to provide a[n] ITWOM-based set of subroutines compatible with the current FCC FORTRAN ITM-based software, is in progress.” Sidney Shumate, Givens & Bell Comments at 2. Givens & Bell has indicated it will submit this software to the Commission today. DISH suggests that it be carefully and immediately reviewed.

¹⁶ Kurby Reply Analysis at 2.

Review of Comments Filed in Response to the FCC's *Further Notice* on the Predictive Model, FCC 10-194

By Christopher Kurby, MEM, MEE, BSEE

Cost-Benefit Analysis and ITWOM

In determining if the ILLR propagation model should be changed to improve its accuracy in predicting unserved households, the National Association of Broadcasters (“NAB”) observes: “In applying this standard, the Commission has wisely and appropriately applied a cost/benefit test to proposed modifications, refusing to adopt those that, at best, would provide only marginally more accurate predictions.”¹

NAB goes on to say that the Commission refrained from changing the dipole planning factor from 615 MHz to 573 MHz because this would have resulted in only a 0.6 dB change and, in the Commission’s view, the cost-benefit threshold was not met. Here, however, the improvement from 6.61 dBu to 1.93 dBu is a convincing 4.68 dB, which cannot be discounted as inconsequential. Using these errors in predicting range and coverage area with an assumed nominal range of 50km with a 600m base antenna, the chart below was generated.

Table 1: Table of coverage prediction error from Shumate data

model	range initial (Km)	delta E(dB/uv)	r2/r1	sqr(r2/r1)	r2
ITWOM	50	1.93	1.09	1.19	54.50
ILLR	50	6.61	1.40	1.96	70.08

Here we see that the ILLR model error of 6.63 dBu over-predicts the coverage area by 96% whereas the ITWOM model reduces this to only a 19% over-prediction. In my view, the improvement certainly passes the cost/benefit test. The fact that the ITWOM model still results in many more over-predictions than under-predictions is no doubt a serious concern, and it does underscore the importance of finding the median difference between predicted and actual strength. But as I have suggested, this concern can be mitigated by subtracting the average exceedance of predicted over actual strength from the ITWOM model’s predicted strength until this residual error can be removed through further refinement.

In reference to the Shumate field studies, NAB states: “Indeed, a methodology that virtually uniformly over-predicts signal strength, even if by only 2 dBu on average, is a methodology that will almost certainly under-predict eligibility and therefore will be *less accurate* than the current ILLR model.”² This is an odd argument, coming as it does *in defense* of the ILLR model. If 2 dBu is a significant over-prediction, and it is, the 6.63 dBu over-prediction of the ILLR model is

¹ NAB Comments at iii.

² NAB Comments at 14.

significantly more serious still. Again, the number of over-predictions (versus the amount of under-predictions) is a potential problem of the ITWOM model, one that should – and can – be resolved.

In our comments, we noted that the data cited by Jules Cohen on behalf of NAB in ET Docket No. 00-11 (the land use/clutter proceeding) had reported more under-predictions than over-predictions for the ILLR model.³ But the Shumate data, if correct, discredit this earlier broadcast submission, and undermine the basis for setting the land use/clutter adjustment for VHF signals at zero.⁴

ILLR, AntennaWeb and ITWOM methods

This proceeding demonstrates that there are potential refinements that can be made to the predictive model and that they should be evaluated seriously. The reply comments of DIRECTV state that the AntennaWeb method for predicting broadcast service is more accurate than the present ILLR model due to a variety of improvements on the base ILLR model. Among other things, the AntennaWeb method apparently uses a 90%, versus 50%, confidence factor. The other factors listed are small but meaningful improvements to the ILLR model and are also applicable to any other model (*e.g.*, the ITWOM model).

The enhancements contained in the AntennaWeb program can readily be used in addition to the new propagation processes offered by Mr. Shumate in the ITWOM model to possibly further improve it.

Therefore, it seems prudent to compare known field data to all three models for pure accuracy both in terms of average and median error in the following manner:

- 1) ILLR model as it exists.
- 2) AntennaWeb.
- 3) ITWOM standing alone.
- 4) ITWOM with the improvements contained in the AntennaWeb program.

All of these should be normalized to the same antenna gain and at a 90% confidence factor to provide an apples to apples comparison.

³ DISH Comments at 5.

⁴ Shumate Comments in ET Docket Nos. 00-11, 10-152 (August 24, 2010).

References

[1] S. Shumate, Givens & Bell, Inc., Response to ET Docket No. 00-11, ET Docket No. 10-152 (August 24, 2010).

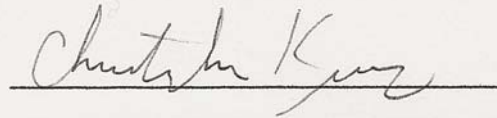
[2] The National Association of Broadcasters and the Association for Maximum Service Television, Response to FCC 10-194, ET Docket No. 10-152 (January 21, 2011).

[3] Further Notice Comments of DIRECTV, Inc., Response to FCC 10-194, ET Docket No. 10-152 (January 21, 2011).

DECLARATION

I, Christopher Kurby, declare that I have prepared the foregoing engineering analysis using facts of which I have personal knowledge or upon information provided to me. I declare under penalty of perjury that the foregoing is true and correct to the best of my information, knowledge and belief.

Executed on February 7, 2011.

A handwritten signature in cursive script, reading "Christopher Kurby", is written over a horizontal line.

Christopher Kurby, MEM, MEE, BSEE